What is claimed is:

1. A process for the deposition of films on substrates by sputtering or magnetron sputtering, especially for the fabrication of multilayer systems, comprising the step of:
regulating a working gas pressure, a distance between a target and a substrate, or a combination thereof at least at one deposition stage so that the mean free path of particles is chosen smaller than the distance between target and substrate.

2. A process as claimed in claim 1, further including the step of regulating the working gas pressure, the distance between target and substrate, or a combination thereof at least at one other deposition stage so that the mean free path of particles is chosen larger than the distance between target and substrate.

3. A process for the deposition of films on substrates by sputtering or magnetron sputtering, especially for the fabrication of multilayer systems, comprising the step of:
choosing a working gas pressure and a distance between a target and a substrate at least at one deposition stage to result in a product of pressure in Pa and distance in cm being larger than about 2.0 cmPa.

4. A process as claimed in claim 3, further including the step of choosing the working gas pressure and the distance between target and substrate are chosen to result in a product of pressure in Pa and distance in cm being smaller than about 2.0 cmPa at least at one other deposition stage.

5. A process as claimed in claim 3, wherein the working gas pressure and the distance between target and substrate are chosen to result in a product of pressure in Pa and distance in cm being larger than about 2.0 cmPa in a first deposition stage and smaller than about 2.0 cmPa in a subsequent deposition stage.

6. A process as claimed in claim 1, wherein magnetron sputtering is utilized, and wherein the magnetron is operated in an unbalanced mode in at least one deposition stage.

7. A process as claimed in claim 2, wherein magnetron sputtering is utilized, and wherein the magnetron is operated in an unbalanced mode in at least one deposition stage.

8. A process as claimed in claim 3, wherein magnetron sputtering is utilized, and wherein the magnetron is operated in an unbalanced mode in at least one deposition stage.

9. A process as claimed in claim 4, wherein magnetron sputtering is utilized, and wherein the magnetron is operated in an unbalanced mode in at least one deposition stage.

10. A process as claimed in claim 1, wherein at least one deposition stage is performed with ion beam assistance, or wherein the thin film is polished by ion beam polishing after deposition, or wherein at least one deposition stage is done by electron beam evaporation, or wherein a bias voltage is applied to the substrate during at least one deposition stage, or wherein the distance between target and substrate is about 25 cm or more, or wherein krypton is used as a working gas and wherein the krypton ions

have an energy of about 50 eV to 1000 eV, or any combination thereof.

11. A process as claimed in claim 2, wherein at least one deposition stage is performed with ion beam assistance, or wherein the thin film is polished by ion beam polishing after deposition, or wherein at least one deposition stage is done by electron beam evaporation, or wherein a bias voltage is applied to the substrate during at least one deposition stage, or wherein the distance between target and substrate is about 25 cm or more, or wherein krypton is used as a working gas and wherein the krypton ions have an energy of about 50 eV to 1000 eV, or any combination thereof.

12. A process as claimed in claim 3, wherein at least one deposition stage is performed with ion beam assistance, or wherein the thin film is polished by ion beam polishing after deposition, or wherein at least one deposition stage is done by electron beam evaporation, or wherein a bias voltage is applied to the substrate during at least one deposition stage, or wherein the distance between target and substrate is about 25 cm or more, or wherein krypton is used as a working gas and wherein the krypton ions have an energy of about 50 eV to 1000 eV, or any combination thereof.

13. A process as claimed in claim 4, wherein at least one deposition stage is performed with ion beam assistance, or wherein the thin film is polished by ion beam polishing after deposition, or wherein at least one deposition stage is done by electron beam evaporation, or wherein a bias voltage is applied to the substrate during at least one deposition stage, or wherein the distance between target and substrate is about 25 cm or more, or wherein

krypton is used as a working gas and wherein the krypton ions have an energy of about 50 eV to 1000 eV, or any combination thereof.

14. A process as claimed in claim 1, wherein at least one deposition stage a plasma is ignited in proximity of the target, a magnetic field is applied in proximity of the ignited plasma and the target oriented in a way that the magnetic field lines extend to the substrate's surface and a voltage of about 200 V or less is applied between plasma source and target.

15. A process as claimed in claim 3, wherein at least one deposition stage a plasma is ignited in proximity of the target, a magnetic field is applied in proximity of the ignited plasma and the target oriented in a way that the magnetic field lines extend to the substrate's surface and a voltage of about 200 V or less is applied between plasma source and target.

16. A process as claimed in claim 14, wherein the plasma source is a magnetron, or wherein the surface to be etched is biased to about -50 V to -2000 V, or a combination thereof.

17. A process as claimed in claim 15, wherein the plasma source is a magnetron, or wherein the surface to be etched is biased to about -50 V to -2000 V, or a combination thereof.

18. A process for the deposition of films on substrates by electron beam evaporation, especially for the fabrication of multilayer systems, comprising the steps of:
performing at least one deposition stage by sputtering or magnetron sputtering; and

regulating a working gas pressure, a distance between a target and a substrate, or combinations thereof, at this deposition stage so that the mean free path of particles is chosen smaller than the distance between target and substrate.

19. A process for ion etching of surfaces, especially of magnetron sputtered films, comprising the steps of
providing a working gas, a target and a plasma source;,
igniting a plasma in proximity of the target;
applying a magnetic field in proximity of the ignited plasma and the target oriented in a way that the magnetic field lines extend to the surface to be etched; and
applying a voltage of about 200 V or less between plasma source and target.

20. A process as claimed in claim 19, wherein the plasma source is a magnetron.

21. A process as claimed in claim 19, wherein the surface to be etched is biased to about -50 V to -2000 V.

22. A process as claimed in claim 20, wherein the surface to be etched is biased to about -50 V to -2000 V.

23. A device for the deposition of films on substrates, especially for the fabrication of multilayer systems, by sputtering or magnetron sputtering, comprising: a substrate holder, at least one magnetron with target, a regulator for regulating the working gas pressure and a regulator for regulating the distance between target and substrate holder.

24. A device for the deposition of films on substrates, especially for the fabrication of multilayer systems, by sputtering or magnetron sputtering, comprising: a substrate holder and at least one magnetron with target, wherein the distance between substrate holder and target is about 25 cm or more.

25. A device as claimed in claim 23, comprising at least one additional plasma source, or an electron beam source, or combinations thereof.

26. A device as claimed in claim 24, comprising at least one additional plasma source, or an electron beam source, or combinations thereof.

27. A device as claimed in claim 23, comprising a magnetizing unit in proximity of the target, the magnetizing unit being oriented in a way that the magnetic field lines extend to the surface of the substrate holder.

28. A device as claimed in claim 24, comprising a magnetizing unit in proximity of the target, the magnetizing unit being oriented in a way that the magnetic field lines extend to the surface of the substrate holder.

29. A device as claimed in claim 25, comprising a magnetizing unit in proximity of the target, the magnetizing unit being oriented in a way that the magnetic field lines extend to the surface of the substrate holder.

30. A device as claimed in claim 26, comprising a magnetizing unit in proximity of the target, the magnetizing unit being oriented in a

way that the magnetic field lines extend to the surface of the substrate holder.

31. A device for etching, comprising: a substrate holder, a plasma source and a magnetizing unit in proximity of a target, the magnetizing unit being oriented in a way that the magnetic field lines extend to the surface of the substrate holder.

32. A device as claimed in claim 31, wherein the plasma source is a magnetron.

33. An optical device comprising a multilayer system on a substrate, the multilayer system being produced according to the process as claimed in claim 1.

34. An optical device comprising a multilayer system on a substrate, the multilayer system being produced according to the process as claimed in claim 3.

35. An optical device comprising a multilayer system on a substrate, the multilayer system being produced according to the process as claimed in claim 18.

36. A lithographic projection apparatus comprising an optical device according to claim 33.

37. A lithographic projection apparatus comprising an optical device according to claim 34.

38. A lithographic projection apparatus comprising an optical device according to claim 35.